

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED / ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371		ATTORNEY'S DOCKET NUMBER P66724US0
INTERNATIONAL APPLICATION NO. PCT/FR99/02991 ✓	INTERNATIONAL FILING DATE 2 December 1999 ✓	US APPLICATION NO. (If known, see 37 CFR 1.5) 09/856164 ✓
TITLE OF INVENTION MOVEMENT-SENSING APPARATUS FOR SOFTWARE		
APPLICANT(S) FOR DO/EO/US Jean BONNARD, Fabien HERMAND and Frederic NICOLAS ✓		

Applicant herein submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information.

1. This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. A proper Demand for Internatl. Preliminary Examination was made by the 19th month from earliest claimed priority date.
5. A copy of the International Application as filed (35 U.S.C. 371(c)(2))
 - a. is transmitted herewith (required only if not transmitted by the International Bureau).
 - b. has been transmitted by the International Bureau.
 - c. is not required, as the application was filed in the United States Receiving Office (RO/US)
6. A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
 - a. are transmitted herewith (required only if not transmitted by the International Bureau).
 - b. have been transmitted by the International Bureau.
 - c. have not been made; however, the time limit for making such amendments has NOT expired.
 - d. have not been made and will not be made.
8. A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. A translation of the annexes to the Internatl. Preliminary Examination report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. below concern other document(s) or information included:

11. An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. An assignment document for recording. A separate cover sheet compliance with 37 CFR 3.28 and 3.31 is included.
13. A **FIRST** preliminary amendment.
 - A **SECOND** or **SUBSEQUENT** preliminary amendment.
14. A substitute specification.
15. A change of power of attorney and/or address letter.
16. Other items or information:

International Search Report - EPO
PCT Request Form
PCT/IB/301 Form
PCT/IB/304 Form
First Page of Publication
International Preliminary Examination Report - with annexes
Verification of Translation

US APPLICATION NO.(If known, see 37 CFR 1.5) 09/856164	INTERNATIONAL APPLICATION NO PCT/FR99/02991	ATTORNEY'S DOCKET NUMBER P66724US0
17. <input checked="" type="checkbox"/> The following fees are submitted:		CALCULATIONS PTO USE ONLY
Basic National Fee (37 CFR 1.492(a)(1)-(5)):		
Internatl. prelim. examination fee paid to USPTO (37 CFR 1.492 (a) (1)) . . . \$690.00		
No international preliminary examination fee paid to USPTO (37 CFR 1.492 (a) (2)) but international search fee paid to USPTO (37 CFR 1.445(a)(2)) . . . \$710.00		
Neither international preliminary examination fee (37 CFR 1.492 (a) (3)) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO) \$1000.00		
International preliminary examination fee paid to USPTO (37 CFR 1.492 (a) (4)) and all claims satisfied provisions of PCT Article 33(2)-(4) \$100.00		
Search Report prepared by the EPO or JPO (37 CFR 1.492 (a) (5)) \$860.00		\$ 860.00
ENTER APPROPRIATE BASIC FEE AMOUNT =		
Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input checked="" type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).		\$ 130.00
Claims	Number Filed	Number Extra
Total Claims	10 - 20 =	-0-
Independent Claims	1 - 3 =	-0-
Multiple Dependent Claim(s) (if applicable)		+ \$270.00
TOTAL OF ABOVE CALCULATIONS =		\$ 990.00
Reduction by 1/2 for filing by small entity , if applicable. Verified Small Entity statement must also be filed. (Note 37 CFR 1.9, 1.27, 1.28).		\$
SUBTOTAL =		\$ 990.00
Processing fee of \$130 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f))		\$
TOTAL NATIONAL FEE =		\$ 990.00
Fee of \$40.00 for recording the enclosed assignment (37 CFR 1.21(h)). Assignment must be accompanied by appropriate cover sheet (37 CFR 3.28, 3.31).		\$
TOTAL FEES ENCLOSED =		\$ 990.00
		Amt. to be refunded: \$
		Amt. charged: \$
<p>a. <input checked="" type="checkbox"/> A check in the amount of \$ 990.00 to cover the above fees is enclosed.</p> <p>b. <input type="checkbox"/> Please charge my Deposit Account No. <u>06-1358</u> in the amount of \$ to cover the above fees. A duplicate copy of this sheet is enclosed.</p> <p>c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge my account any additional fees set forth in §1.492 during the pendency of this application, or credit any overpayment to Deposit Account No. <u>06-1358</u>. A duplicate copy of this sheet is enclosed.</p>		
SEND ALL CORRESPONDENCE TO:		
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Jean BONNARD et al.

Serial No.: New

Filing Date: June 4, 2001

For: MOVEMENT-SENSING APPARATUS FOR SOFTWARE

PRELIMINARY AMENDMENT

Assistant Commissioner of Patents
Washington, D.C. 20231

Sir:

Prior to initial examination, please amend the above-identified application as follows:

IN THE CLAIMS

Please amend claims 3 through 10 as follows:

3. (amended) Apparatus according to claim 1, characterized in that the sensor includes a magnetic detector (23d) for placing on one side of the joint and a piece (22d) that is detectable by the detector (23d) and placed on the other side of the joint.

4. (amended) Apparatus according to claim 1, characterized in that the sensor includes an air bag (220d) and a sensor (23d) responsive to a pressure increase that appears in said air bag (210d).

5. (amended) Apparatus according to claim 1, characterized in that the sensor (20d, 20g, 40d, 40g) includes a mechanically-controlled switch (123d) for placing on a first side of the joint, and a projecting piece (122d) for placing on the opposite side of the joint and designed to constitute an abutment for said mechanically-controlled switch (123d).

6. (amended) Apparatus according to claim 1, characterized in that the sensor (20d, 20g, 40d, 40g) is designed to be placed on a shoulder of the user.

7. (amended) Apparatus according to claim 1, characterized in that the sensors (20d, 20g, 40d, 40g) is designed to be placed on a hip of the user.

8. (amended) Apparatus according to claim 1, characterized in that the sensor (20d, 20g, 40d, 40g) is designed to be placed on an ankle joint.

9. (amended) Apparatus according to claim 1, characterized in that it comprises mechanical members (10, 30d, 30g) for applying mechanical actions on parts of the user's body under the control of a computer.

10. (amended) Apparatus according to claim 1, characterized in that it includes a processor module (10) suitable for transforming the output signals from the sensor (20d, 20g, 40d, 40g) into signals usable by the computer.

REMARKS

The foregoing Preliminary Amendment is requested in order to delete the multiple dependent claims and avoid paying the multiple dependent claims fee.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "VERSION WITH MARKINGS TO SHOW CHANGES MADE."

Early action on the merits is respectfully requested.

Respectfully submitted,

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Atty. Docket: P66724US0
Date: June 4, 2001
cmf

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS

3. (amended) Apparatus according to claim 1 [or claim 2], characterized in that the sensor includes a magnetic detector (23d) for placing on one side of the joint and a piece (22d) that is detectable by the detector (23d) and placed on the other side of the joint.
4. (amended) Apparatus according to claim 1 [or claim 2], characterized in that the sensor includes an air bag (220d) and a sensor (23d) responsive to a pressure increase that appears in said air bag (210d).
5. (amended) Apparatus according to claim 1 [claims 1 or claim 2], characterized in that the sensor (20d, 20g, 40d, 40g) includes a mechanically-controlled switch (123d) for placing on a first side of the joint, and a projecting piece (122d) for placing on the opposite side of the joint and designed to constitute an abutment for said mechanically-controlled switch (123d).
6. (amended) Apparatus according to claim 1 [any preceding claim], characterized in that the sensor (20d, 20g, 40d, 40g) is designed to be placed on a shoulder of the user.
7. (amended) Apparatus according to claim 1 [any preceding claim], characterized in that the sensors (20d, 20g, 40d, 40g) is designed to be placed on a hip of the user.

8. (amended) Apparatus according to claim 1 [any preceding claim], characterized in that the sensor (20d, 20g, 40d, 40g) is designed to be placed on an ankle joint.

9. (amended) Apparatus according to claim 1 [any preceding claim], characterized in that it comprises mechanical members (10, 30d, 30g) for applying mechanical actions on parts of the user's body under the control of a computer.

10. (amended) Apparatus according to claim 1 [any preceding claim], characterized in that it includes a processor module (10) suitable for transforming the output signals from the sensor (20d, 20g, 40d, 40g) into signals usable by the computer.

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MOVEMENT-SENSING APPARATUS FOR SOFTWARE

The invention relates to software control means constituting sensors for sensing the movement of a part of a user's body.

5 Such control means conventionally include elements which reproduce a control or guide element (a joystick, a steering wheel, control pedals) and elements which are fixed to the body of a user (e.g. the arms or the hands) and that are designed to sense movements while impeding 10 them as little as possible.

Thus, document US 5 229 756 proposes a boxing fight simulator in which the user is fitted with elbow-bend sensors each fixed on a sleeve to measure the bend angle of an elbow and deliver an analog signal representative 15 of said angle, which analog signal is subsequently converted into a digital signal for storing and processing.

That type of apparatus suffers from a major drawback.

20 The signal delivered by the sensor must be processed by a converter and by a computer, both requiring large computation and memory capacity.

In practice, that type of apparatus is used only with hardware and software specially designed for such an 25 application because of the high requirements inherent to such sensors.

The main object of the invention is to propose apparatus which is suitable for transforming the position or displacement of a user's limb into a control signal 30 which is significantly representative of said position or displacement, while requiring little by way of computation and memory capacity.

A second object of the invention is to propose such apparatus using movement sensors that are compact and not 35 expensive to make.

According to the invention, these objects are achieved by a system for transforming the movements of at

least one joint of a user selected from the group constituted by the knee, the elbow, the shoulder, the hip, or the ankle, into control signals for a computer, the system comprising a sleeve for putting on over the 5 joint and a movement sensor fixed to the sleeve, the apparatus being characterized in that the sensor is an on/off sensor and is directly subject to the movements of the walls of the sleeve.

10 The present apparatus makes it possible to use body movement sensors with home type games consoles or with a personal computer, e.g. running existing video games.

15 Other objects, characteristics, and advantages of the invention will appear on reading the following detailed description given with reference to the accompanying figures, in which:

- Figure 1 is a diagram of apparatus of the invention without the user;
- Figure 2 shows the same apparatus, in place on a user;
- 20 • Figure 3 shows a games handset;
- Figure 4 shows such a games handset coupled to an elbow-movement sensor of the invention;
- Figure 5 shows a switch movement sensor in another variant of the invention;
- 25 • Figure 6 shows an elbow-movement sensor operating on air pressure, constituting another variant of the invention;
- Figure 7 shows apparatus of the invention in a detailed front view;
- 30 • Figure 8 is a block diagram representing the operation of a central processor module for the Figure 7 apparatus;
- Figure 9 is a diagram showing the operation of a two-part unit constituted by a movement sensor and a control handset for the apparatus of Figures 7 and 8; and
- 35 • Figure 10 is a diagram showing the operation of a knee movement sensor of the apparatus of Figures 7 and 8.

AMENDED SHEET

This translation of an amended page covers the amendments made in the original. However, the page breaks match the translation, so that this page is also a replacement page that fits in with the remainder of the translation.

The apparatus of Figure 1 is of star architecture, having a center constituted by a preprocessor module 10 and four branches, constituted by wire connections carrying movement sensors 20d, 20g, 40d, and 40g.

5 In this case, the movement sensors are responsive to knee bending 40g, 40d and to elbow bending 20g, 20d.

The two branches, each including an elbow-bending sensor 20d and 20g, are extended beyond the sensor to a controlling handset 30d, 30g provided with a pad of 10 pushbuttons 35g, 35d.

As can be seen in Figure 2, when a user wears the module 10 on the abdomen, the wire connections run along the user's arms and thighs to the sensors, with the connections between the elbow sensors 20g, 20d and the handsets 30g, 30d extending substantially along the forearms, so as to interfere as little as possible with the movements of the user.

When the bending sensors 20g, 20d, 40g, 40d or the pushbuttons 35g, 35d are activated, corresponding signals are passed from these elements to the module 10. The module 10 then processes these signals, after which it sends the processed signals over an outlet connection 15 to a computer (not shown) and it sends them in a format that is acceptable for the computer.

25 Each bending sensor is mounted on a flexible sleeve 21d, 21g, 41d, 41g put on around the joint in question. The sleeve is constituted merely by a strip of cloth.

In Figure 4, it can be seen that the sleeve 21d extends both ways from the elbow around the upper arm and 30 the forearm (and for the knee, the sleeve extends around the thigh and the calf).

The sleeve has portions on the inside of the joint. In particular, on either side of the elbow, it has two inner surfaces which move towards each other or away from 35 each other depending on whether the user bends or straightens the arm.

Advantage is taken of this property by placing a movement sensor on at least one of said two surfaces.

In Figure 4, two component parts of a Hall effect magnetic sensor are placed on these two surfaces, namely 5 a small magnet 22 on the inside face of the forearm and a receiver part 23 responsive to said magnet on the inside face of the biceps.

The receiver part 23 includes three wires defining 10 two electrical circuits, a first circuit which is open or closed depending on whether the magnet 22 is respectively close to or far away from the part 23, and a second circuit which on the contrary is closed or open depending on whether the magnet 22 is close or far away.

In the present embodiment, a connection 25d having 15 two wires connects the terminals of one of these two circuits to the module 10.

Depending on whether the elbow is bent or not, an 20 electric signal flows or does not flow in the circuit and the connection 25d.

In a variant, the connection 25d has two additional 25 wires connected to the other circuit so as to provide, in addition, complementary information.

The present magnetic movement sensor thus delivers a 30 positive or zero signal depending on whether the joint is bent or straight.

It is thus the position of the joint at a given instant which determines the value of the signal, regardless of whether the joint is stationary or moving at that instant.

In a variant, a movement sensor is used which 35 delivers an on or off signal as a function of the direction in which the joint is moving and not as a function of its actual position.

While the joint is being bent, the sensor takes up a first state, and while the joint is being straightened, 40 the sensor takes up a second state, independently of the degree to which the joint is extended.

Using on/off information supplied by a movement sensor, it is possible to detect bending movement or straightening movement (e.g. a punch or a kick in a combat game) or indeed the extended or bent position (e.g. corresponding to the attitude of a virtual actor, pressures on the pushbutton 35d and 35g triggering displacements or jumps of the actor).

In a variant, the movement sensor shown in Figure 5 comprises, on the inside surfaces of the joint, on one side a mechanically controlled switch 123, in this case having a lever, and on the other side a piece of foam 122 projecting from the forearm, the switch 123 being actuated by coming into abutment against said piece of foam 122.

In this case, the switch is controlled mechanically by a lever (a lever-operated microswitch), but it could equally well be controlled by a wheel or by a fork.

In a variant of the sensor shown in Figure 6, a bag of air 220d is placed in the hollow of the elbow, and the pressure therein increases when it is compressed.

A switch 230 is fixed to the sleeve 21d close to the bag 220d, and has a control finger 235 that projects into the bag 220d and that is driven therein like a piston under the effect of the increased pressure.

The bag 220d advantageously has openings 225 allowing air to be expelled from the bag so as to avoid impeding bending movements, these openings being small enough to maintain sufficient extra pressure while the air is being expelled.

The detector is thus responsive to a sudden increase in pressure, i.e. an elbow-bending stage.

The switch 230 can be replaced by a conventional air pressure sensor and the bag can also be made to be hermetically sealed or inflated.

Other on/off sensors can be used for taking advantage of movements of the joint, for example pressure sensors, longitudinal displacement sensors, or radial

displacement sensors. The motion sensors can be passive, i.e. they can require external power feeding to them in order to indicate an open or closed position of the joint (or the presence of joint movement in a given direction), 5 or they can be active, i.e. not requiring their own power supply.

The pushbuttons 35d, 35g in the handsets 30g, 30d are situated at the tops of the handset so as to be suitable for being actuated by the thumbs as on the 10 control joysticks commonly used for games consoles.

In this case, wire connections are used as shown in Figure 4, combining the wires 26d coming from the handset 30d and the wires coming from the elbow sensor 20d, this 15 set of wires going from the forearm to the module 10 in the form of a connection 27d.

Figures 7, 8, and 9 show a preferred layout for the various electrical connections between the module 10 and the sensors and handset in the above case where the 20 sensors 20g, 20d, 40g, and 40d are all formed by respective switches 28g, 28d, 48g, 48d.

Each handset 30g and 30d in this case comprises four pushbuttons each corresponding to a respective switch 31g, 32g, 33g, 34g.

A series connection 50g interconnects the module 10, 25 the elbow sensor 20g, and the handset 30g (60g for the knee). By means of this connection, the module 10 delivers a non-zero potential to the sensor 20g, and to the handset 30g. This potential is delivered to one of the terminals of the elbow switch 20g and to one of the 30 terminals of each of the switches in the handset 30g.

Each opposite terminal of each of these five switches is connected via a respective connection 51g, 52g, 53g, 54g, or 55g to the module 10, and the module 35 detects whether or not that connection is returning the potential.

In an ideal arrangement, the four return connections from the handset 30g and the corresponding power supply

connection 50g are combined in a single insulating sheath 26g which extends from the handset 30g to the vicinity of the sensor 20g as two branches, one of which is connected to the sensor 20 including a go line and a return line of 5 the connection 50g, and the other of which combines the power and return connections both for the handset 30g and for the sensor 20g.

As shown in Figures 8 and 9, the module 10 has two buttons E1 and E2 for starting a video game, for moving 10 in the menu of the game, and for resetting the software.

The module 10 makes use of the on/off information coming from the various sensors and pushbuttons, and calibrates it in a format suitable for the computer located at the other end of the connection 15.

15 The module 10 itself includes a computer for performing digital pre-processing on the signals that come from the sensors, and for transforming them into data suitable for use by the external computer.

20 In the present case, the external computer is a games console, and the data output from the module 10 is applied to the inputs of the console normally connected to the joysticks, i.e. a set of contacts themselves designed to receive on/off signals.

25 For this purpose, such apparatus delivers a signal having the same format as the signals obtained from traditional joystick or pushbutton controls.

30 The processing performed in this case by the module 10 is particularly simple, and consists merely in transforming a zero or non-zero signal into digital logic levels of predetermined form similar to the logic levels obtained at the outputs from conventional joysticks.

35 In a variant, the module 10 includes a computer programmed to transform the on/off signals provided by the sensors into information that is specially encoded for a given external computer, and to perform such treatment in various ways that can be selected as a

function of the external computer to which the apparatus is connected.

In the present preferred embodiment, the remote computer unit (not shown) generates signals which are sent to the module 10 that responds, after suitable processing, by applying them to mechanical playback members, e.g. pneumatic members fitted to the body, so that the control signals sent to the module 10 are transformed into physical signals applied to the body of the user (a type of biofeedback).

Thus, in the present case, the module 10 and the handsets 30g and 30d are fitted with out-of-balance weights rotated by electric motors to vibrate in order to represent explosions or shooting with certain weapons.

Other types of playback (virtual reality helmet, earphones, effect-return harnesses, vibrating seats or boxes, etc.) can also be adopted.

Naturally, numerous variants can be provided by the person skilled in the art in the ambit of the present invention.

For example, the connections between the sensors 20g, 20d, 40g, 40d and the module 10 can be wireless connections.

The module 10 can be placed on the user at some other location, for example on the hip, or indeed can be placed beside the user. Similarly, the connection between the system of the invention and the external computer unit can be by means of a wireless connection.

The movement sensors can be placed on joints other than the elbows or the knees, for example on the shoulder for a sensor that picks up the position of an entire arm or on the hip for a sensor that picks up the position of an entire leg.

In a variant, the system of the invention has additional sensors for picking up the movements of the user's feet, for example, on the ankle joint in order to pick up the stretching action of a kick. In combat video

games, the action of stretching out a kick can give rise, for example, to the virtual actor jumping.

Advantageously, the system of the invention has additional sensors in the form of a floor mat comprising 5 foam that includes contacts, making it possible to pick up movements of the user's feet (e.g. the action of moving a foot forward), and convert these movements into virtual movements. In combat video games, the action of moving a foot in front of the body can give rise, for 10 example, to the virtual actor moving forwards.

The external digital processor unit need not be a computer or a console, for example it could be a complete video games machine of the kind to be seen in video gaming arcades, it could be an interactive terminal, 15 etc., with users bringing their own systems of the invention and connecting them directly to the external processor units.

The present apparatus of the invention can then be used equally well at the user's home, in a video gaming 20 arcade, in a bar, at an airport, at a casino, or in any other location, since the system of the invention is easy to transport, and requires no more than an external processor unit capable of receiving and using the signals issued by the system of the invention, which signals are 25 of the same type as the signals issued by the usual controls or joysticks for such an external processor unit.

The types of software for which the present system 30 of the invention is suitable include a very wide range of options, and depending on the needs of the moment, the user can select from this wide range the option that specifically satisfies the user's requests.

Thus, although the following list is not exhaustive, the system of the invention can be used with software for 35 combat games, software for simulating sports in general (basketball, football, golf, skiing, etc.), software for learning movements (gymnastics, swimming, aerobics,

boxing, racing, and indeed training in the use of a set of drums, etc.), video conference software, and more generally remote presence software, including over the Internet (animating an avatar), etc. . . .

5 The system of the invention advantageously includes adaptors enabling the various connection means between the module 10 and the external processor unit to be adapted for making connections with various kinds of microcomputer, consoles, and integrated video games
10 machines of the type to be found in games parlors.

15 The input/output means connecting the module 10 to the external processor are adapted as a function of the type of digital processor on which the software is run, with the types of connection being constituted, for example, by connections of the "joystick" type or of the pushbutton ("pad") type, or of some other type.

20 The module 10 also has means for adjusting the sensitivity of the signals delivered by the movement sensors, and for giving particular functions to such and such a sensor.

25 Such apparatus can be used with existing software since the signals output by the apparatus are, in a preferred embodiment, identical to the signals output by the joysticks that are commonly in use, and the signals input to the system of the invention can be processed in a manner analogous to the manner in which they are presently processed by certain joysticks and sensation simulators.

30 It should be observed that in the example described, all of the standard functions of common joysticks are to be found in the system of the invention.

35 The system can also be used with software that can be written in the future, secure in the knowledge that widespread use will be possible (because of its compatibility with existing joysticks), while nevertheless providing new modes of use by means of the apparatus of the invention, or indeed with software

written specially for the system of the invention (e.g. software for home gymnastics, where the user's movements are picked up, quantized, and assessed by the software, or indeed software enabling users to meet virtually).

5 The system is compact and easy to transport.

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CLAIMS

1/ A system for transforming the movements of at least one joint of a user selected from the group constituted by the knee, the elbow, the shoulder, the hip, or the ankle, into control signals for a computer, the system comprising a sleeve (21d, 21g, 41d, 41g) for putting on over the joint and a movement sensor (20d, 20g, 40d, 40g) fixed to the sleeve, the apparatus being characterized in that the sensor (20d, 20g, 40d, 40g) is an on/off sensor and is directly subject to the movements of the walls of the sleeve (21d, 21g, 41d, 41g).

2/ Apparatus according to claim 1, characterized in that the sensor (20d, 20g, 40d, 40g) is designed to be placed and held in the hollow of the joint.

3/ Apparatus according to claim 1 or claim 2, characterized in that the sensor includes a magnetic detector (23d) for placing on one side of the joint and a piece (22d) that is detectable by the detector (23d) and placed on the other side of the joint.

4/ Apparatus according to claim 1 or claim 2, characterized in that the sensor includes an air bag (220d) and a sensor (23d) responsive to a pressure increase that appears in said air bag (210d).

5/ Apparatus according to claim 1 or claim 2, characterized in that the sensor (20d, 20g, 40d, 40g) includes a mechanically-controlled switch (123d) for placing on a first side of the joint, and a projecting piece (122d) for placing on the opposite side of the joint and designed to constitute an abutment for said mechanically-controlled switch (123d).

6/ Apparatus according to any preceding claim,
characterized in that the sensor (20d, 20g, 40d, 40g) is
designed to be placed on a shoulder of the user.

5 7/ Apparatus according to any preceding claim,
characterized in that the sensors (20d, 20g, 40d, 40g) is
designed to be placed on a hip of the user.

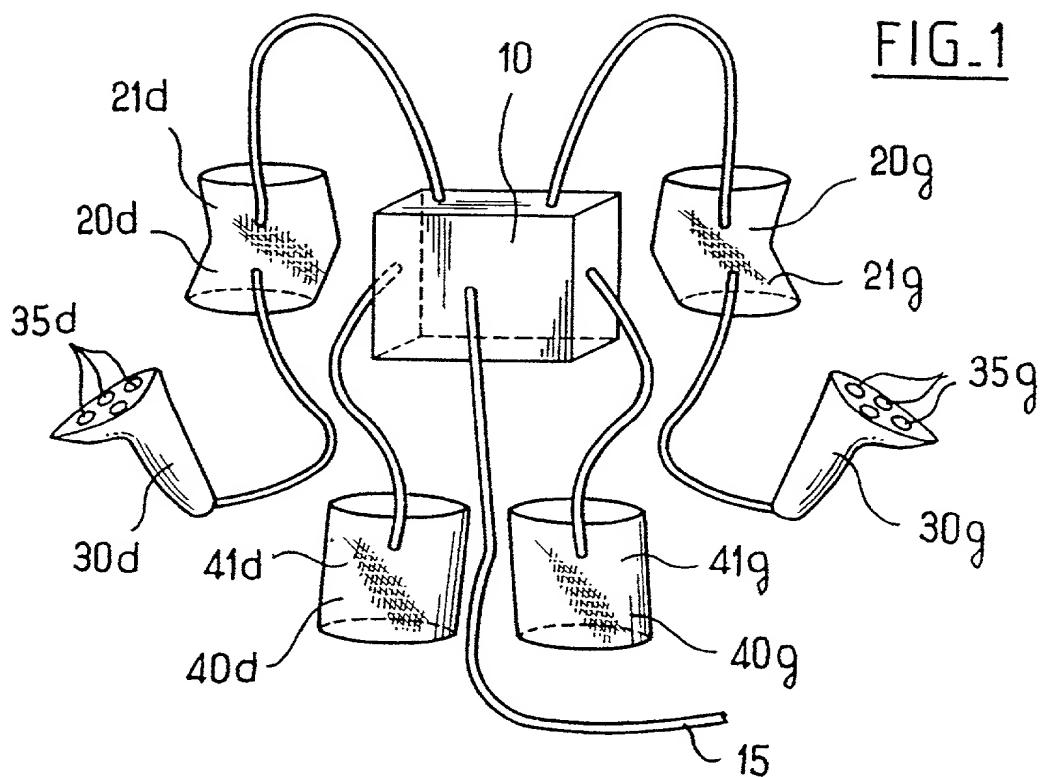
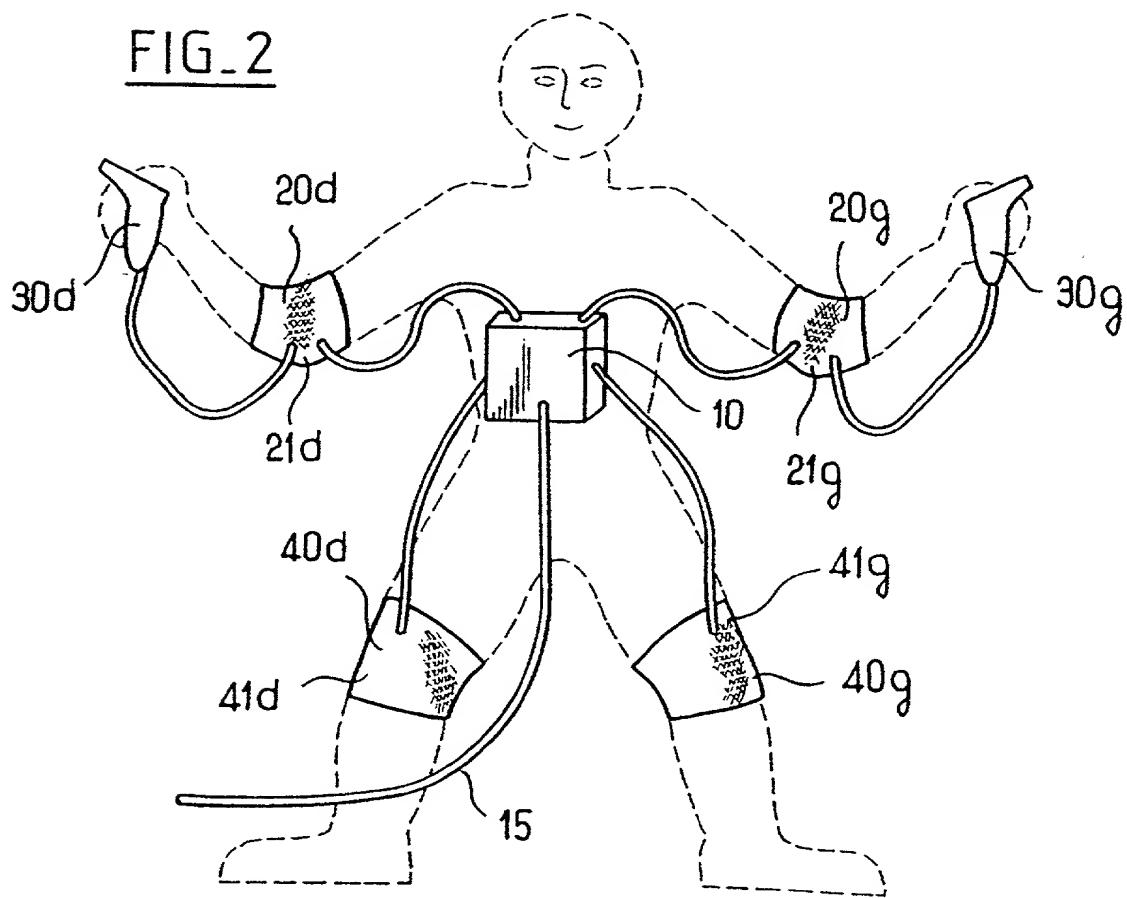
10 8/ Apparatus according to any preceding claim,
characterized in that the sensor (20d, 20g, 40d, 40g) is
designed to be placed on an ankle joint.

15 9/ Apparatus according to any preceding claim,
characterized in that it comprises mechanical members
(10, 30d, 30g) for applying mechanical actions on parts
of the user's body under the control of a computer.

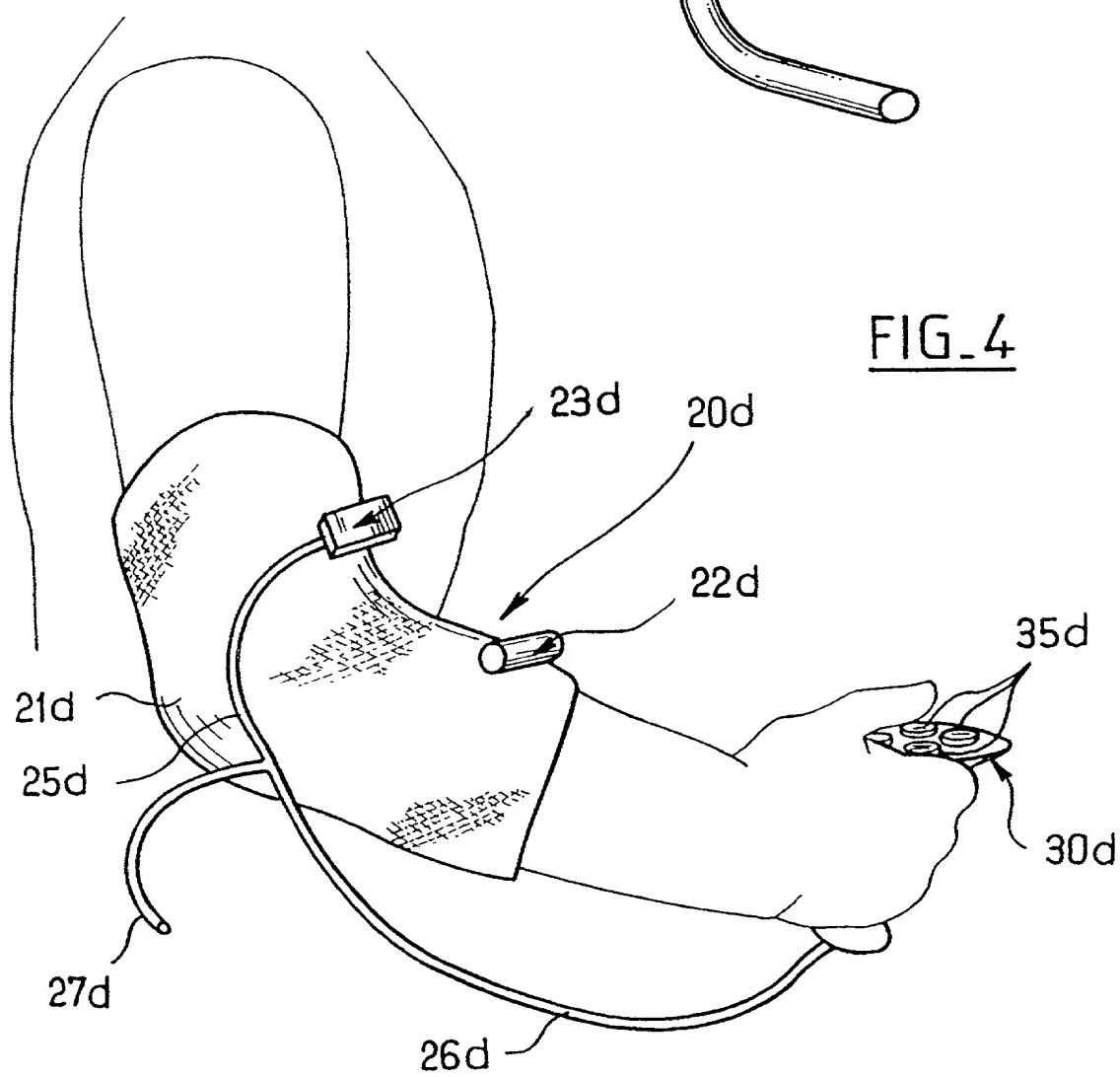
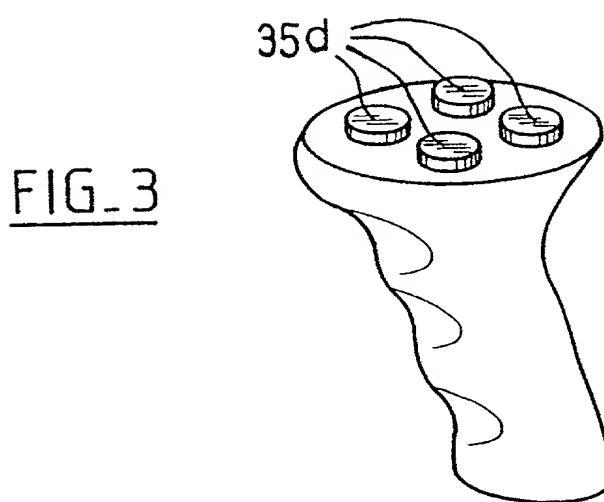
20 10/ Apparatus according to any preceding claim,
characterized in that it includes a processor module (10)
suitable for transforming the output signals from the
sensor (20d, 20g, 40d, 40g) into signals usable by the
computer.

AMENDED SHEET

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FIG. 2

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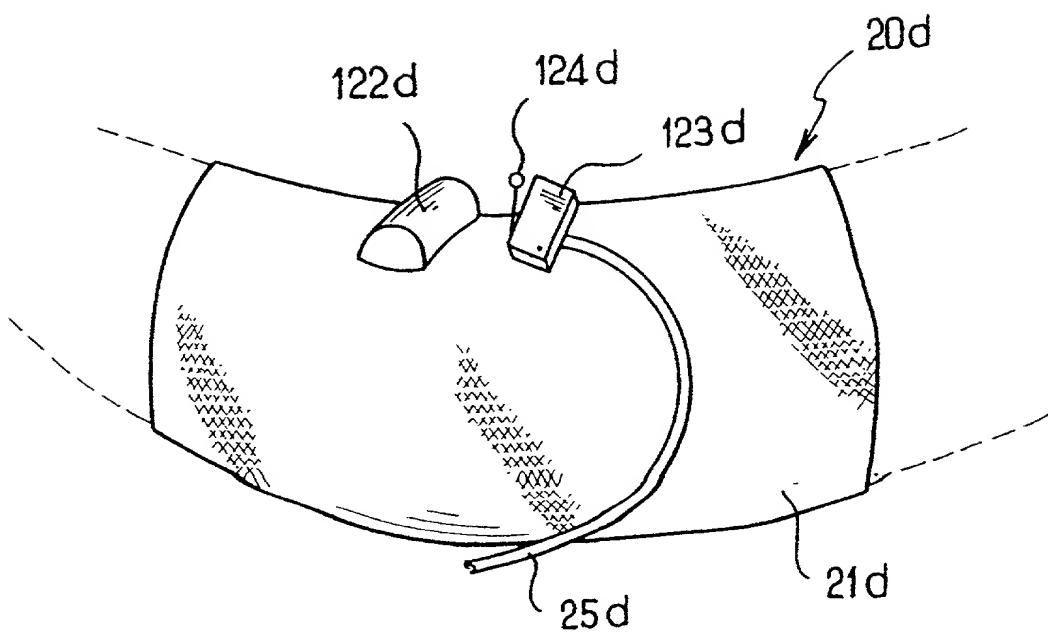


FIG. 5

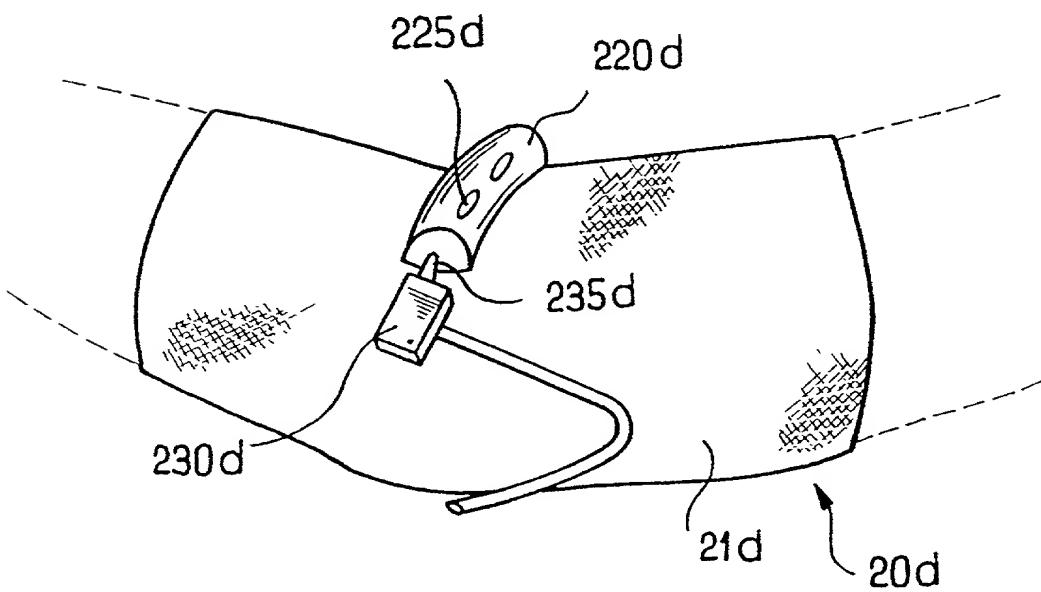
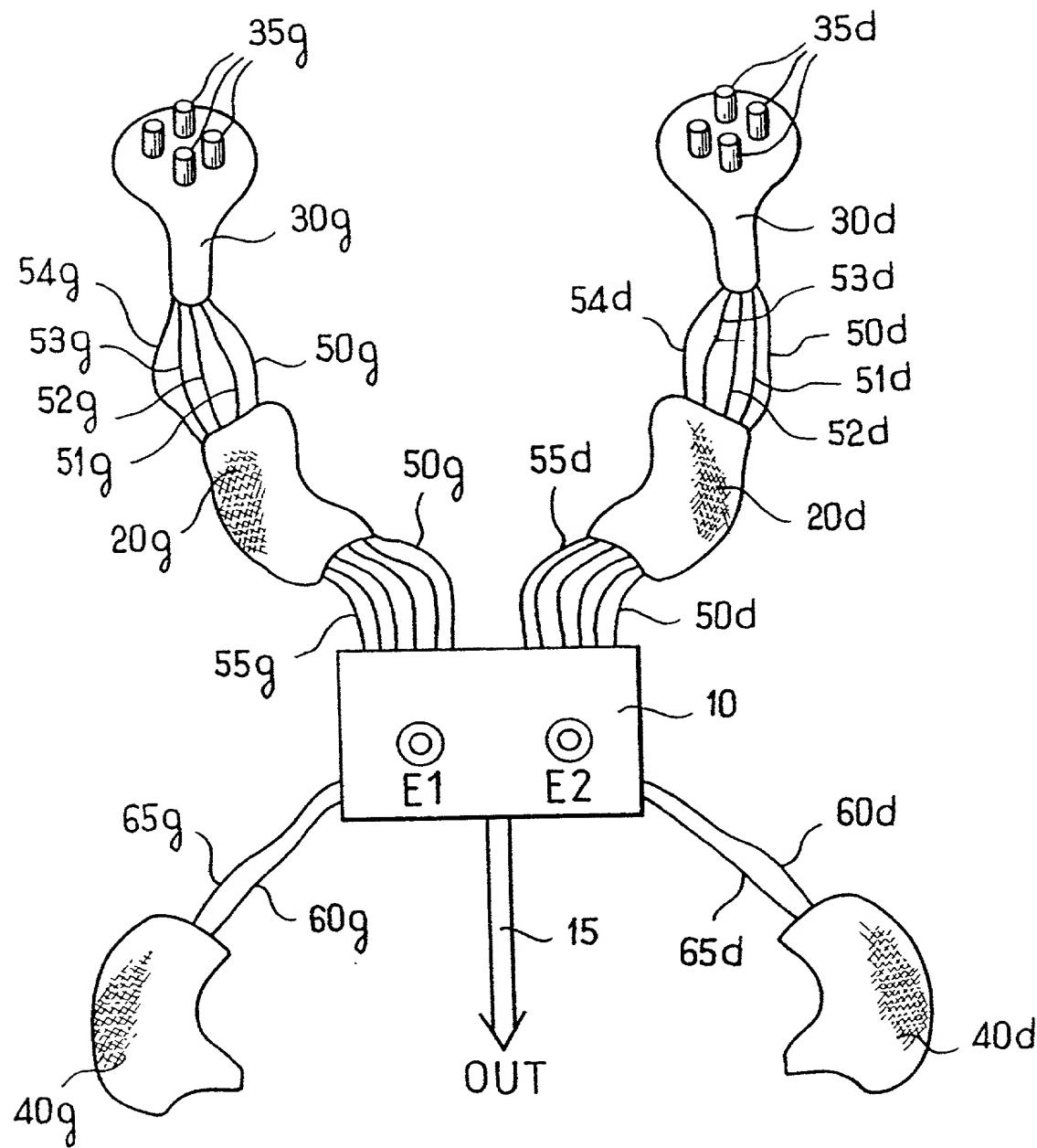
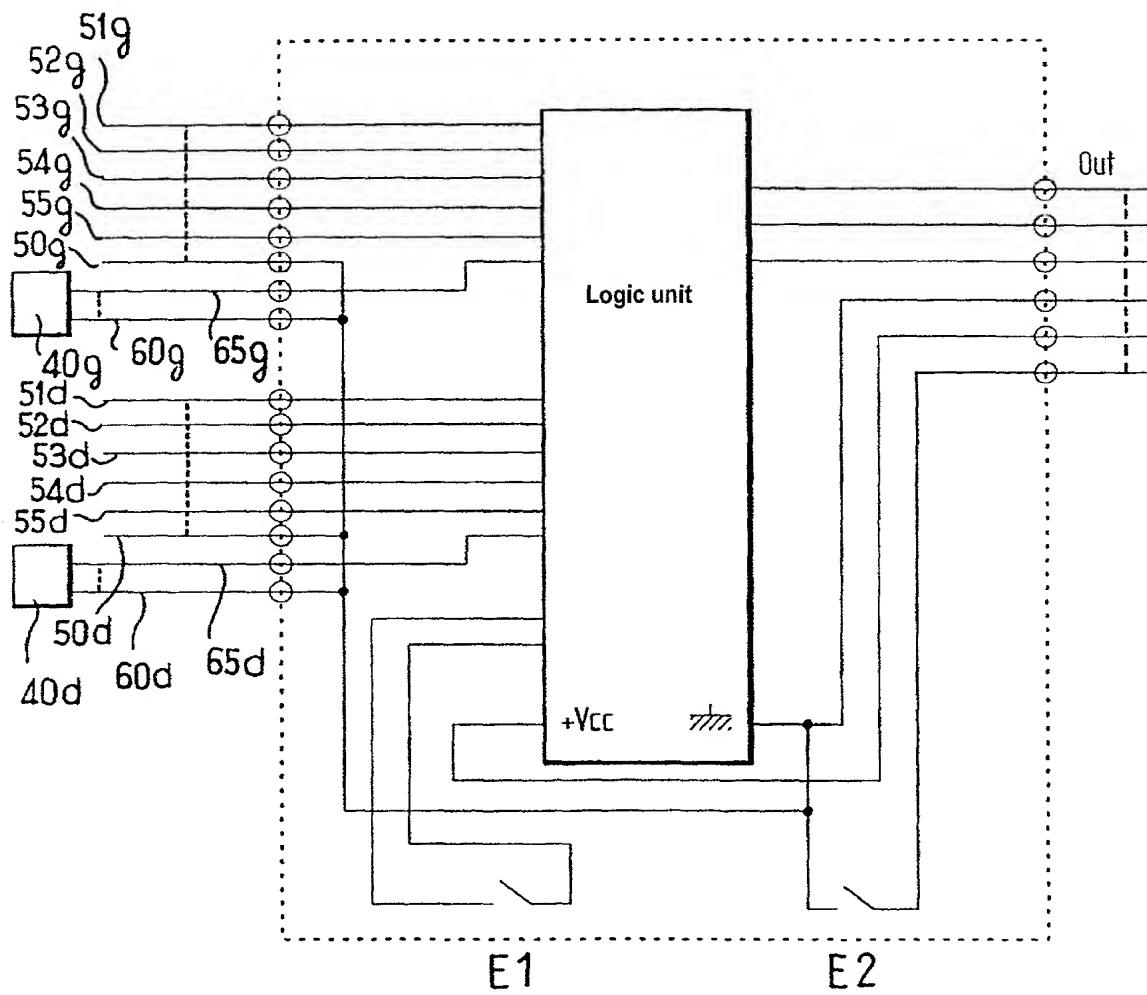


FIG. 6

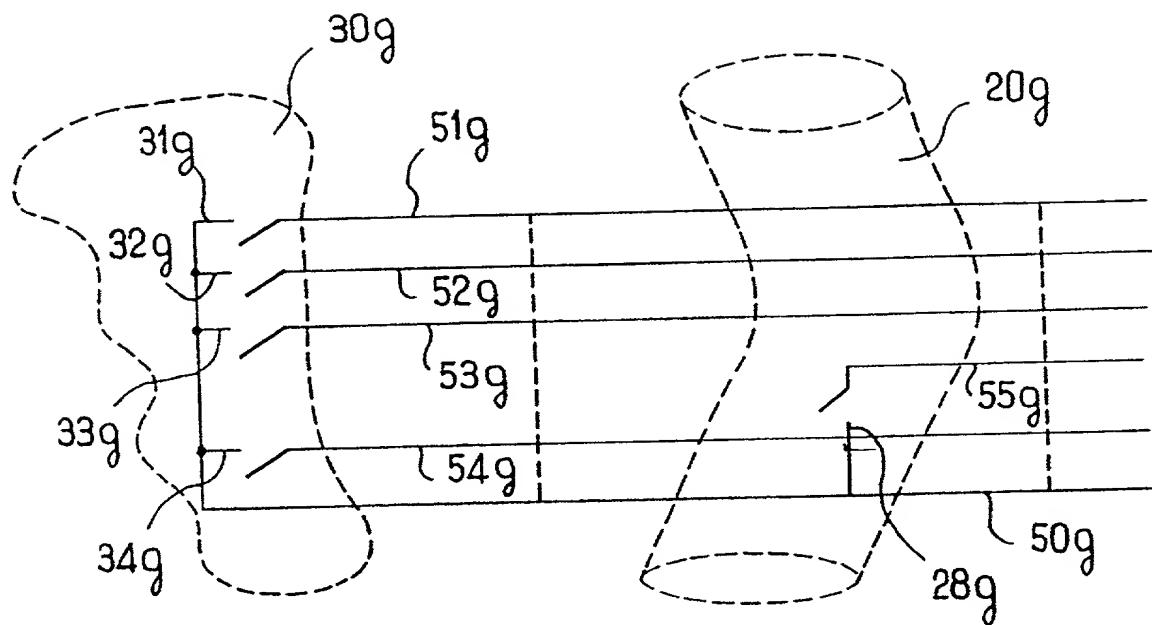
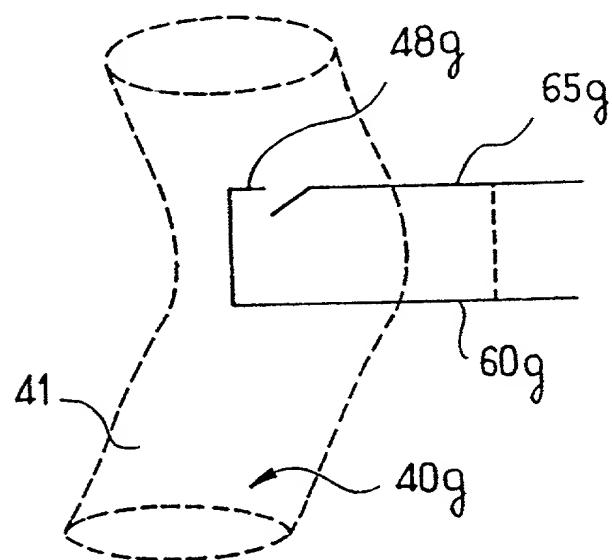
476

FIG.7

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FIG.8

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FIG_9FIG_10

**DECLARATION
AND POWER OF ATTORNEY
U.S.A.**

OR ATTORNEYS' USE ONLY

ATTORNEYS' DOCKET NO.

ALL PATENTS, INCLUDING DESIGN
FOR APPLICATION BASED ON PCT; PARIS CONVENTION;
NON PRIORITY; OR PROVISIONAL APPLICATIONS

As a below named Inventor, I declare that my residence, post office address and citizenship are stated below next to my name, the information given herein is true, that I believe that I am the original, first and sole inventor (if only one name is listed at 201 below), or an original, first and joint inventor (if plural inventors are named below at 201-203, or on additional sheets attached hereto) of the subject matter which is claimed and for which patent is sought on the invention entitled:

MOVEMENT-SENSING APPARATUS FOR SOFTWARE

which is described and claimed in: PCT International Application No. **FR99/02991** filed **December, 02, 2001**
 the attached specification filed _____
 the specification in application Serial No. _____
 (if applicable) and amended on _____

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above. I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56. I hereby claim foreign priority benefits under Title 36, United States Code, §119 (a)-(d) of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)

FR98 15266 **FRANCE** **03 December 1998**

(Number) (Country) (Day/Month/Year Filed)

(Number) (Country) (Day/Month/Year Filed)

(Number) (Country) (Day/Month/Year Filed)

Priority Claimed

Yes No

Yes No

Yes No

I hereby claim the benefit under Title 35, United States Code, §119(e) of any United States provisional application(s) listed below:

Application No. **PCT/FR99/02991** Filing Date **02 DECEMBER 1999** Application No. **PENDING** Filing Date _____

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

Application No. **PCT/FR99/02991** Filing Date **02 DECEMBER 1999** Status: patented, pending, abandoned

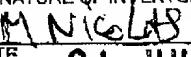
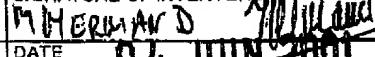
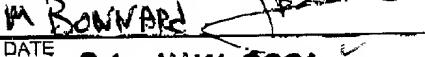
POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorneys (Registration No.) to prosecute this application, receive and act on instructions from my agent, and transact all business in the Patent and Trademark Office connected therewith. HARVEY B. JACOBSON, JR. (20,851); D. DOUGLAS PRICE (24,514); JOHN CLARKE HOLMAN (22,769); MARVIN R. STERN (20,640); ALLEN S. MELSER (27,215); MICHAEL R. SLOBASKY (26,421); JONATHAN L. SCHERER (28,851); IRWIN M. AISENBERG (19,007); WILLIAM E. PLAYER (31,409); YOON S. HAM (45,307) and NATHANIEL A. HUMPHRIES (22,772)

SEND CORRESPONDENCE TO: CUSTOMER NO. 00136 or JACOBSON, PRICE, HOLMAN & STERN PROFESSIONAL LIMITED LIABILITY COMPANY 400 SEVENTH STREET, N.W. WASHINGTON, D.C. 20004	DIRECT TELEPHONE CALLS TO: (please use Attorney's Docket No.) (202) 838-8666 JACOBSON, PRICE, HOLMAN & STERN PROFESSIONAL LIMITED LIABILITY COMPANY
--	---

*Inventor(s) name must include at least one unabbreviated first or middle name.

FULL NAME * OF INVENTOR	FAMILY NAME NICOLAS Frédéric	GIVEN NAME	MIDDLE NAME
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POST OFFICE ADDRESS	POST OFFICE ADDRESS 25, rue de l'Echaudey	CITY MORET-SUR-LOING	STATE OR COUNTRY FRANCE ZIP CODE 77250
FULL NAME * OF INVENTOR	FAMILY NAME HERMAND Fabien	GIVEN NAME	MIDDLE NAME
RESIDENCE & CITIZENSHIP	CITY PARIS PRX	STATE OR FOREIGN COUNTRY FRANCE	COUNTRY OF CITIZENSHIP FRANCE
POST OFFICE ADDRESS	POST OFFICE ADDRESS 16, rue Geoffroy-Marie	CITY PARIS	STATE OR COUNTRY FRANCE ZIP CODE 75009
FULL NAME * OF INVENTOR	FAMILY NAME BONNARD Jean	GIVEN NAME	MIDDLE NAME
RESIDENCE & CITIZENSHIP	CITY PARIS PRX	STATE OR FOREIGN COUNTRY FRANCE	COUNTRY OF CITIZENSHIP FRANCE
POST OFFICE ADDRESS	POST OFFICE ADDRESS 42 bis, rue des Cascades	CITY FRANCE	STATE OR COUNTRY FRANCE ZIP CODE 75020

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both, under section 1001 of Title 18 of the United States Code; and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

SIGNATURE OF INVENTOR 201* 	SIGNATURE OF INVENTOR 202* 	SIGNATURE OF INVENTOR 203* 
DATE 04 JUIN 2001	DATE 04 JUIN 2001	DATE 04 JUIN 2001

Additional inventors are named on separately numbered sheets attached hereto.

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Law Offices of
JACOBSON, PRICE, HOLMAN & STERN
 PROFESSIONAL LIMITED LIABILITY COMPANY
 THE JENIFER BUILDING
 400 SEVENTH STREET, N.W.
 WASHINGTON, DC 20004

Attny's Docket No. _____



SMALL ENTITY DECLARATION
 [37 CFR 1.9(c-f)]

Each undersigned declares that:

- (1) the application attached hereto.
- (2) U.S. Application Serial No. _____, filed _____
- (3) U.S. Patent No. _____ Issued _____

is entitled to the benefits of "small entity" status for paying reduced fees under 35 USC 41(a) and (b) to the Patent and Trademark Office by virtue of the following:

(4) Each undersigned declares that he/she qualifies as an independent inventor, or would qualify had he/she made the invention, as defined in 37 CFR 1.9(c).

(5) The undersigned declares that he/she is an official empowered to act on behalf of the concern identified below; that this concern qualifies as a small business concern as defined in 37 CFR 1.9(d); that exclusive rights to the invention have been conveyed to and remain with the small business concern, or if the rights are not exclusive, that all other rights belong to small entities as defined in 37 CFR 1.9.

(6) The undersigned declares that he/she is an official empowered to act on behalf of the organization identified below; that this organization qualifies as a nonprofit organization as defined in

- (a) 37 CFR 1.9(e)(1)
 (b) 37 CFR 1.9(e)(2)
 (c) 37 CFR 1.9(e)(3)

(d) 37 CFR 1.9(e)(4) State law of _____
 that exclusive rights to the invention have been conveyed to and remain with the organization, or if the rights are not exclusive, that all other rights belong to organizations as defined in 37 CFR 1.9.

(7) Each person, concern or organization to which I/we have assigned, granted, conveyed or licensed, or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

(a) no such person, concern or organization

(b) persons, concerns or organization listed below

[a separate declaration is required from each named person, concern or organization having rights to this invention averring to their status as "small entities."]

Full Name 1) Nicolas Frédéric; 2) Hermand Fabien 3) Bonnard Jean

Address 1) MORET-SUR-LOING/FR; 2) PARIS/FR ; 3) PARIS/FR

Individual

Small Business Concern

Nonprofit Organization

I/we acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement of small entity prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I/we hereby declare all statements made herein of his/her own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application, any patent issued thereon, or any patent to which this declaration is directed.

(8) NICOLAS Frédéric

Typed Name of Inventor

Signature

HERMAND Fabien

Signature

Typed Name of Inventor

Typed Name of Inventor

Signature

(9) _____

Name of Small Business Concern or Nonprofit Organization

By

Signature

04 JUIN 2001

Date 04 JUIN 2001

Date 04 JUIN 2001

Date 04 JUIN 2001

Title of Signatory

INSTRUCTIONS FOR THE COMPLETION OF SMALL ENTITY DECLARATION

Check box (1) if for use with application about to be filed.

Check box (2) or (3) if for use with application already on file or Patent and complete U.S. Serial No. and Filing Date, or Patent No. and issue date, if known.

CHECK ONLY ONE OF BOXES 4, 5 OR 6, WHICHEVER IS APPLICABLE

Check box (4), individuals who are either: (a) an inventor or (b) a person who would qualify as an independent inventor had he/she made the invention, must sign and date at (8), if he/she have not, and are under no obligation to assign, grant, convey or license any right in the invention to any person who could not likewise be classified as an independent inventor if that person had made the invention or to any concern which would not qualify as a small business concern or non-profit organization (see below).

Check box (5), date, complete name of small business concern and authorized signatory, sign and complete his/her title at (9), if small entity status is claimed by virtue of inventor(s) rights having been, or being obligated to assign, grant, convey or license, to a concern whose number of employees, including those of its affiliates, does not exceed 500 persons. Concerns are affiliates when either controls, directly or indirectly, or has the power to control, the other, or a third party has the power to control both. Number of employees is average over fiscal year of those employed during each pay period, including full-time, part-time or temporary employees. If the small business concern has or is under obligation by contract or law to transfer any rights to another who cannot qualify as small entity, then small entity status not applicable.

Check box (6) and subsection (a), (b), (c) or (d), date, complete name of the nonprofit organization and authorized signatory sign and complete his/her title at (9), if small entity status is claimed by virtue of inventor(s) rights having been, or being obligated to, assign, grant, convey or license, to a nonprofit organization. Subsection (6)(a) to be checked if organization is university or other institution of higher learning; (6)(b) to be checked if organization of type described in Section 501(c)(3) of IRS Code and exempt from taxation under Section 501(a); (6)(c) to be checked if organization is nonprofit scientific or educational organization qualified under a statute of State of the U.S.; and (6)(d) to be checked if foreign organization and would qualify under (6)(b) or (6)(c) if such organization was located in the U.S.A. Fill in the State law under which the organization would qualify.

Check box (7)(a) or (b) as the facts dictate.

IMPORTANT

(1) Note that U.S. lawyers and agents cannot complete this document after signed. Therefore please completely fill it in before sending to us.

(2) Each person, concern or organization that has an interest in this invention must sign one of the "Small Entity" Declarations. For example, if an inventor/employee has an obligation to assign to his employer, a corporation having fewer than 500 employees, which corporation has licensed this invention to a licensee corporation also having less than 500 employees, then three "Small Entity" declarations are necessary before the lesser fee can be paid: one from the inventor; one from an official of the employer; and one from an official of the licensee. In the declarations by the inventors and the employer paragraph 7(b) would have to be checked and filled in, the licensee would check paragraph 7(a).

We will be pleased to answer your questions. You may contact us in the following ways:

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